

REMARKS/ARGUMENTS

Status of the Application

Prior to the entry of this amendment, claims 1-12 were pending in this application. The Final Office Action rejected claims 1-3 and 6-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,446,009 to Baeten *et al.* (“Baeten”) in view of U.S. Patent No. 6,654,693 to Sen *et al.* (“Sen”), rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Baeten in view of Sen and U.S. Patent No. 4,277,834 to Garibotto (“Garibotto”) and rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Baeten in view of Sen and Tuanyi *et al.*, IEEE INTERNATIONAL CONFERENCE ON INTELLIGENT PROCESSING SYSTEMS; *Seismic Data Time-Frequency Domain Filter with Wavelet Transform* pages 1223-1226 (1977) (“Tuanyi”).

The present amendment amends independent claim 1 and cancels claim 4. Therefore, claims 1-3 and 5-12 are presented for examination in this amendment. No new matter is added by the amendment of independent claim 1.

35 U.S.C. § 103 Rejections

In the Final Office Action independent claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Baeten in view of Sen. As amended, independent claim 1 describes a method for marine seismic data acquisition that includes the features of obtaining a 3D wavefield by cross-line acquisition, in which a source(s) is towed orthogonally with respect to one or more lines of marine seismic receivers, and decomposing the obtained seismic wavefield by applying a decomposition filter having two spatial directions to obtain a decomposed wavefield, wherein the decomposition filter is applied as a cascaded filter.

Applicant respectfully submits that the Baeten reference does not describe or make any mention of a dynamic method for marine seismic data acquisition, in which, as provided in independent claim 1, a source is towed behind a seismic vessel and over a line(s) of seismic

receivers. Nor does the Baeten reference teach or suggest use of a cascaded decomposition filter to decompose the wavefield obtained by a cross-line marine seismic acquisition method.

To the contrary, while the Baeten reference does acknowledge that seismic data may be acquired on land or over water (*See* Baeten, Col. 1, lines 12-14), the Baeten reference describes a method for acquiring seismic data that is only applicable to the acquisition of seismic data over land – the method described in Baeten is an improved way of addressing ground roll, something which is not an issue in seismic data acquisition and processing over water where the seismic source is located in the water and does not create ground roll. (*See* Baeten Col. 2, lines 57-65 “It is an object of the present invention to provide an improved method of acquiring and processing seismic data that eliminates many of the disadvantages of conventional seismic data acquisition systems that utilize hardwired receiver arrays to attenuate ground roll and random noise” (emphasis added) and whole document).

As such, applicant respectfully submits that, apart from the general and well understood acknowledgement that seismic data may be acquired on land or over water, the Baeten reference provides absolutely no teaching or suggestion regarding marine seismic data acquisition and processing because the reference specifically concerns addressing an issue, ground roll, that does not occur in marine seismic data acquisition and processing. Consequently, there is no motivation nor any suggestion to combine the teaching about land seismic acquisition – the attenuating of ground roll effects – of Baeten, which address an issue not found in marine seismic acquisition – with the teachings of marine seismic techniques, such as the Sen reference.

Moreover, not only does the Baeten reference describe a method to address an issue that is not found in marine seismic data acquisition, the reference also provides absolutely no teaching or suggestion that the disclosed method could be used in marine seismic methods. To the contrary, it would be very unexpected that a method for addressing an issue not found in marine seismic data acquisition could have any applicability to marine seismic acquisition. In fact, Applicant submits that it would be *de facto* inventive to take a method that applies to a

problem not found in the marine seismic field and to use the method to solve an issue in the marine field since successful application of the method would be wholly unexpected.

The Sen reference discloses a method for attenuating free surface multiples in marine seismic data. (*See* Sen, Abstract). Therefore, the combination of Baeten and Sen would be a method of seismic data acquisition and processing in which ground roll effects are removed and free surface multiples are attenuated. Applicant notes that the result of the actual combination of the cited references does not describe the invention of claim 1 of the present invention as amended.

Furthermore, Applicants have amended claim 1 to include the feature that the decomposition filter applied to the acquired wavefield in the marine seismic acquisition is a cascaded filter. This feature is not taught in either the Baeten reference or the Sen reference. (*See* Final Office Action at ¶3). In fact, in the Final Office Action, yet a further reference, the Garibotto reference, is cited as teaching a cascaded filter. The cited Garibotto reference concerns a method for determining a location of a seismic source, such as the epicenter of a seismic tremor. As such, the Garibotto reference does not describe a seismic data acquisition process, but instead concerns another technical field, seismology.

Applicant respectfully submits that no motivation exists in the Baeten reference, which describes a method for addressing ground roll, the Sen reference, which describes a method for attenuating free surface effects, nor the Garibotto reference, which describes seismology method for ascertaining epicenters of earthquakes or the like, for combining the three references. To the contrary, absent impermissible hindsight, it would require inventive inspiration to combine such inapposite and disparate references and it would be totally unexpected to obtain any kind of meaningful result in the marine seismic acquisition and processing field from such a combination. Moreover, the actual combination would provide a method for detecting locations of seismic sources where ground roll effects and free surface reflections are addressed and attenuated, which is not the method of claim 1, as amended.

Consequently, Applicant respectfully submits that no motivation exists to combine the Baeten, Sen and Garibotto references, that the combination of the references would not

produce the method of independent claim 1, that it would be unpredictable, to say the least, to get any kind result by combining a method for addressing an issue not found in marine seismic acquisition with a marine processing method and a seismology method and that in fact, formulating such a combination would be, absent hindsight, inventive. Therefore, Applicant requests that the Section 103 rejections be withdrawn.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

In the event that a fee or refund is due in connection with this Amendment, the Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No 19-0615. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned.

Respectfully submitted,

/Helene Raybaud/
Helene Raybaud
Registration No. L0531

Date: November 19, 2009
Schlumberger Doll Research
One Hampshire Street
Cambridge, MA 02139
Tel: 617-768-2271
Fax: 617-768-2402